REMARKS

Claims 1 - 21 are presently pending. In the above-identified Office Action, the Examiner objected to the Specification, Abstract, and Information Disclosure in the Specification. Claims 1 - 4, 7, 8 and 21 were rejected under 35 U.S.C. § 102(b) as being anticipated by Applicants' Admitted Prior Art (AAPA). Claims 5, 6 and 9 - 20 were rejected under 35 U.S.C. § 103(a) as being anticipated by AAPA.

An Information Disclosure Statement including copies of cited references to be incorporated into the specification and considered by the Examiner is hereby being submitted in a separate paper.

By this Amendment, Applicants have addressed the objections to the Specification, Abstract, and Information Disclosure in the Specification and amended Claims 1, 8, 20 and 21. Claims 1 and 21 have been amended to include the limitation of Claim 7. Claim 8 was amended to depend from Claim 1 inasmuch as Claim 7 has been canceled. Claim 20 has been amended to address the omission noted by the Examiner. For the reasons set forth more fully below, Applicants respectfully submit that the subject Application properly defines an invention patentable over the Prior Art. Reconsideration, allowance and passage to issue are therefore respectfully requested.

The invention addresses the need in the art for a system and method for effecting outgoing wavefront sampling and correction for space-based and other high-energy laser applications. In an illustrative embodiment, the inventive beam control system provides a first beam of electromagnetic energy; samples the first beam and provides a second beam in response thereto. The system then detects aberrations in the second beam and corrects aberrations in the first beam in response to the detected aberrations.

In a specific implementation, the invention includes a beam director telescope having a primary mirror on which a holographic optical element is disposed. The holographic optical element samples the output high-power beam and provides a sampled beam to a wavefront sensor. The wavefront sensor provides signals to an adaptive optics processor. The adaptive optics processor analyzes the sampled wavefront, detects

aberrations therein and provides a correction signal to an optical phased array. Consequently, the output beam is compensated for the optics of the system, including the beam director telescope.

A master oscillator provides a low power reference beam, which illuminates the optical phased array and provides a beam-path wavefront error corrected signal in response thereto. After sampling the refractive distortion in the aperture sharing element (ASE) the beam-path wavefront error corrected signal illuminates the back of the ASE and back reflects off the front surface of the element. **This signal, in turn, is conjugated by the first phase conjugate mirror and transmitted through the ASE to the second phase conjugate mirror. The second phase conjugate mirror conjugates the transmitted signal thus canceling the effect of the first phase conjugation process**. This signal is then amplified and front reflected off the front surface of the ASE to provide the output beam to the beam director telescope, where it is directed to the target. As the front and back reflections off the front surface of the aperture sharing element are phase conjugates of one another, the reflective distortion due to this element, which is not shared by the target track sensor optical path, is removed. Refractive distortions, which are not shared by the target track sensor optical path such as in the aperture sharing element, laser amplifiers, and other optical elements are also removed in this embodiment via the wavefront reversal properties of the first and second phase conjugate mirrors. The residual optical distortions in the laser beam path from the master oscillator output to the target are, therefore, essentially the same as the optical distortions from the target to the target track sensor; and the correction signal applied to the optical phased array also corrects the beam path for the target track sensor.

Hence, the invention provides an integrated phase conjugate laser and adaptive optics control architecture that does not require target loop wavefront sensing and employs outgoing wavefront sampling of the primary beam director mirror.

The invention is set forth in claims of varying scope of which Claim 1, as amended, is illustrative. Claim 1 now reads as follows:

> 1. A beam control system comprising:
> means for providing a first beam of electromagnetic energy;
> second means for sampling said first beam and providing a second beam in response thereto;
> third means for detecting aberrations in said second beam; and
> fourth means, responsive to said detected aberrations, for correcting aberrations in said first beam, **said fourth means including adaptive optical means for generating a phase conjugate laser beam as said first beam.** (Emphasis added.)

None of the references, teach disclose or suggest the invention as presently claimed. That is, none of the references, taken alone or in combination, teach, disclose or suggest a beam control system having means for correcting aberrations and including adaptive optical means for generating a phase conjugate laser beam.

In the above-identified Office Action, the Examiner rejected Claims 7 and 8 under 35 U.S.C. § 102(b) over AAPA and suggested that AAPA discloses an apparatus with means for generating a phase conjugate laser beam as the first beam. However, this is clearly not the case. There is nothing in AAPA which provides a teaching with respect to the use of a phase conjugate laser beam as the first beam as presently claimed. In the event that Applicants have merely overlooked this teaching in the Specification, Applicants hereby request that the Examiner specifically identify the location of the cited teaching in the Specification.

In the alternative, reconsideration, allowance and passage to issue are respectfully requested inasmuch as all of the claims now include a limitation directed to the use of a phase conjugator.

Respectfully submitted,
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